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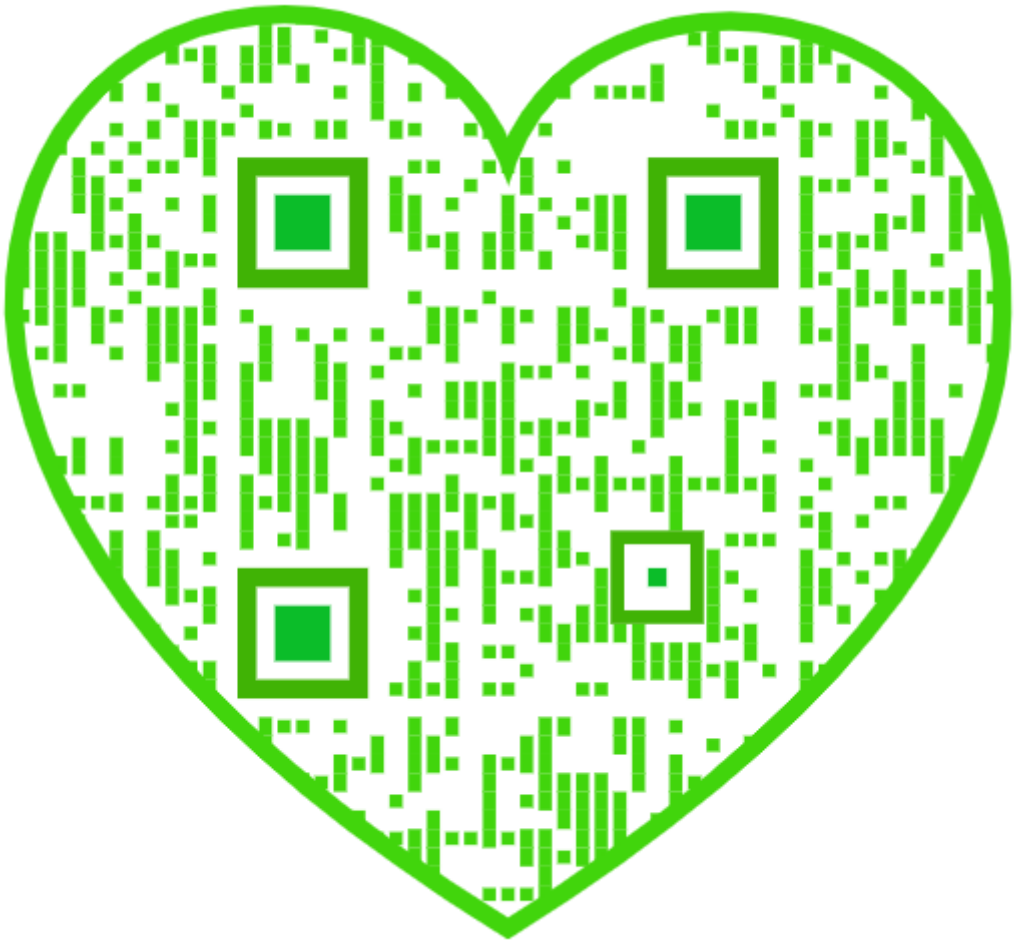

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COLOR

AND ITS DISTRIBUTION IN PRINTING

HOW TO ESTIMATE INK

BY THE SAME AUTHOR

COLOR

AND ITS APPLICATION
TO PRINTING

123 pages 47 illustrations 3 color plates
Price, $2.00—Mail, 10c. extra

P.D.-COOK

COLOR

AND ITS DISTRIBUTION IN PRINTING

HOW TO ESTIMATE INK

By

E·C·ANDREWS

PUBLISHED BY
New and Old Books, Stationery, Blank Books
TH AVE. Near 12th St. NEW YORK
E FOR ANY YOU WANT, CATALOGUES FREE

Copyright, 1916,
by E. C. Andrews.

THE HENRY O. SHEPARD CO., PRINTERS, CHICAGO.

PUBLISHER'S PREFACE.

Among the variable quantities that perplex the printer, the "breaking up" of color surface becomes increasingly difficult as the art of engraving develops and the critical taste of the buying public improves. As the just application of laws depends on foundation principles, the author of this work, Mr. E. C. Andrews, an engineer in chemistry, operating under the opportunities afforded by Philip Ruxton, Incorporated, has reduced the foundation principles of color and its interrelations in distribution to laws that are exemplified by practical examples. In this matter the present work becomes also a sequel and exposition of the principles laid down in the author's previous work, "Color and Its Application to Printing."

An important service has been rendered in this work in the laboratory tests and proofs of the covering power of specific inks on specific surfaces on specific papers. By means of the examples shown, the quantities of ink to be used for any job can be determined with almost absolute accuracy.

The price of this work has been made on its service and not on its cost of manufacture. It is more than a book. It is a gauge to reduce waste and to determine qualities — in color distribution — and quantities, in ink.

A. H. McQuilkin.

AUTHOR'S PREFACE.

Although " Color and Its Application to Printing " has reached the second edition in the original form, it has always been my regret that the various harmonies of color could not have been exemplified in that work. That it has sold in spite of its woeful lack of concrete examples assuredly indicates a desire on the part of many printers to acquire a knowledge of color harmony from a scientific standpoint. Mr. Henry Turner Bailey, editor of " The School Arts Book," in reviewing it, said: " In the realm of color, seeing is believing. The proof of the theory is its actual result in color harmonies." Mr. Bailey's appreciation of the color-scheme of the cover of that volume was so encouraging that I determined that, sooner or later, " Color and Its Application to Printing " would be exemplified. The result is the present volume, and while my great regret is that cost again limited the number of inserts, at least I have been able to avoid the use of enamel paper for the text and preserve correct margins in this work, while in the second edition of " Color and Its Application to Printing " the original error in layout has been carefully (?) followed. Such mistakes happen in the best regulated print-shops, and is a small matter in comparison to the support that *The Inland Printer* has given to problems that interest the printer. To Mr. A. H. McQuilkin, especially, the author expresses his acknowledgment for the cordial and sustained interest he has taken in this supplementary volume.

To Mr. Adolph Jahn, of the Jahn & Ollier Engraving Co., I am indebted for the plates used in printing the inserts. My original intention was to collect from various engravers suitable plates which they might have on hand, and as it happened I presented my problem to Mr. Jahn first of all. When he learned the purpose of this book he felt that it would advance the art and science of printing and not only agreed

to contribute any and all plates, but offered the services of his art department in retouching or preparing copy. The foreign examples were reproduced from colored prints, requiring careful separation of the colors with filters. All of the paper-houses mentioned were most gracious in furnishing paper for experimenting, so that as far as plates and paper were concerned I could have used many more inserts if it was a question of proving only.

Again I must thank Mr. Fred S. Bertsch and Oswald Cooper for the drawing of the title-page and cover-design, as well as for Plates 2 and 3, which demonstrates some of their best work for advertising of this character. To Mr. Frank G. Winter, of the Faithorn Co., I am indebted for the composition of the eight, ten and twelve point type shown on Plates 29 to 37; to Mr. Sherman Ruxton, for help in preparing permanent files of various experiments; to Mr. E. E. Sheldon, of the Lakeside School of Apprentices, for the examples of the work of his students; to Mr. Floyd E. Barmeier, for assistance in weighing when determining covering capacity of ink; to Mr. James F. Kerns, for patient color-matching, and especially am I indebted to Mr. Julius W. Weigel for excellent proving and presswork. May the future larger editions be as well printed!

The number of different kinds of paper in use is so large that I feel that I have done no more than to outline a method of approaching the subject, and for this reason I have left a few blank pages for personal notes on covering capacity and for notations of cognate facts and figures.

November 10, 1916. E. C. ANDREWS.

PLATES, PAPER AND INK USED

All the plates of this book, except the frontispiece, were furnished by the Jahn & Ollier Engraving Co., 554 West Adams street, Chicago, and all printing-inks by Philip Ruxton, Inc., 161 West Harrison street.

BACKBONE LABEL

STOCK: The Paper Mills' Imperial Vellum, 22 x 28. Thickness No. 1.

INKS: Cover Green Z-829.
Cover Brown Z-828.

COVER AND END-SHEETS

STOCK: Strathmore Paper Co. Bannockburn D. E. Cover, 26 x 20 — Light Weight — Shetland Buff.

INKS: Cover Green Z-830.
Cover Brown Z-831.

BODY TEXT

STOCK: The Paper Mills' Company Flat White Dull Uncoated Book, 25 x 38 — 80 pounds.

INK: Dullo Black A-385.

FRONTISPIECE

PLATES: Design and plates by Wm. E. Rudge, 218 William street, New York city. Seven colors.

STOCK: Chicago Paper Company Cromac Offset Book, 25 x 38 — 120 pounds.

INKS: Transparent Yellow Z-800.
Transparent Buff Z-801.
Transparent Pink Z-802.
Transparent Lavender Z-803.
Transparent Light Blue Z-804.
Transparent Purple Z-805.
H. P. Dullo Black A-166.

Plate 1.

Ideal Proportion of the Rectangle.

STOCK: The Paper Mills' Company Alexandra Japan Cream Plate, 25 x 38 — 70 pounds.

INK: H. P. Dullo Black A-166.

Plate 2.

Harmony of Ink and Paper. One Color with Type and Illustration.

STOCK: James White Paper Company Hancock Dull Coated Book — White, 25 x 38 — 100 pounds.

INK: Dullo Green-Black A-214.

Plate 3.

Another Example of Harmony of Ink and Paper.

STOCK: James White Paper Company Hancock Dull Coated Book — India, 25 x 38 — 100 pounds.

INK: Cameo Art Brown C-103.

Plate 4.

Harmony of Half-tone Subject with Stock and Ink.

STOCK: James White Paper Company Hancock Dull Coated Book — India, 25 x 38 — 100 pounds.

INK: Dullopaque Green E-117.

Plate 5.

A Good Analogy in Color of Stock and Ink.

STOCK: J. W. Butler Paper Company "Warren's" Cameo Plate Coated Book — Sepia, 25 x 38 — 90 pounds.

INK: Dullopaque Brown C-95.

Plate 6.

Half-tone in Appropriate Color on Dull White Stock.

STOCK: J. W. Butler Paper Company "Warren's" Cameo Plate Coated Book — Pure White, 25 x 38 — 90 pounds.

INK: Cameo Art Brown C-103.

Plate 7.

The Addition of Two Decorative Colors to Plate 1.

STOCK: The Paper Mills' Company Alexandra Japan Cream Plate, 25 x 38 — 70 pounds.

INKS: H. P. Dullo Black A-166.
Velvet Green No. 411.
Radford Red No. 103.

Plate 8.

Plate 1 on White Stock with Decorative Colors in Higher Value.

STOCK: The Paper Mills' Company Alexandra Japan White Plate, 25 x 38 — 70 pounds.

INKS: H. P. Dullo Black A-166.
Emerald Green No. 401.
Flaming Scarlet No. 150.

Plate 9.

Christmas Announcement by Students, in Red and Black.

STOCK: The Paper Mills' Company San Marco Hand Made, 12 x 17.

INKS: H. P. Dullo Black A-166.
Cover Red Light No. 108.

Plate 10.

Purple as a Decorative Color with Black.

STOCK: Chicago Paper Company Cromac Offset Book, 25 x 38 — 70 pounds.

INKS: H. P. Dullo Black A-166.
Decorative Purple Z-814.

Plate 11.

More Elaborate Example of Purple as a Decorative Color.

STOCK: The Paper Mills' Company Diamond D Suede Finish Book — India, 25 by 38 — 100 pounds.

INKS: H. P. Dullo Black A-166.
Margo Cover Purple No. 912.

Plate 12.

A Dark Yellow-Red (Brown) as a Decorative Color.

STOCK: The Paper Mills' Company Diamond D Suede Finish Book — India, 25 x 38 — 100 pounds.

INKS: H. P. Dullo Black A-166.
Decorative Brown Z-816.

Plate 13.

A Low Chroma Red as a Decorative Color.

STOCK: The Paper Mills' Company Diamond D Suede Finish Book, 25 x 38 — 100 pounds.

INKS: H. P. Dullo Black A-166.
Decorative Dark Red Z-813.
Border Gray Z-811.

Plate 14.

Ideal Distribution of a Low Chroma Red as a Decorative Color.

STOCK: The Paper Mills' Company Diamond D Suede Finish Book — India, 25 x 38 — 100 pounds.

INKS: H. P. Dullo Black A-166.
Decorative Brown C-23.
Border Gray Z-811.

Plate 15.

Green as a Decorative Color with Black.

STOCK: The Paper Mills' Company Diamond D Suede Finish Book, 25 x 38 — 60 pounds. Cream White.

INKS: H. P. Dullo Black A-166.
Decorative Green Z-812.
Border Gray Z-811.

Plate 16.

Simple Analogy of Two Colors with Stock.

STOCK: J. W. Butler Paper Company Gray Single Ply Sunburst Cover, 22 x 28.

INKS: Cover Green-Gray Z-820.
Cover Green Dark.

Plate 17.

Decorative Color in Analogy with Stock. Type Color in Contrast.

STOCK: J. W. Butler Paper Company Gray Single Ply Sunburst Cover, 22 x 28.

INKS: Cover Green-Gray Z-820.
Cover Burnt Umber.

Plate 18.

Ideal Treatment of Colors Similar to Those in Plate 17.

STOCK: Chicago Paper Company Brown Milton Text Deckle Edge, 25 x 40 — 60 pounds.

INKS: Cover Brown Z-823.
Cover Green Dark.

Plate 19.

Attractive and Pertinent Use of Green and Purple.

STOCK: Chicago Paper Company Cromac Offset Book, 25 x 38 — 120 pounds.

INKS: Cover Lilac Z-806.
Cover Green Dark.

Plate 20.

Artistic Balance of Dark Green and Yellow.

STOCK: The Paper Mills' Company Regal Antique Book, 25 x 38 — 80 pounds. India.

INKS: Decorative Buff Z-827.
Text Brown C-6.
St. Paul Green No. 414.

Plate 21.

Elaborate Analogy with Gray and Black Added.

STOCK: J. W. Butler Paper Company Antiquarian Cover Willow, 20½ x 25½. Single-Thick.

INKS: H. P. Dullo Black A-166.
Cover Brown Z-817.
Cover Buff Z-818.
Cover Gray Z-819.

Plate 22.

Two Decorative Invitations.

STOCK: Chicago Paper Company Thracian Cadmus, 20½ x 25 — 65 pounds.

INKS: H. P. Dullo Black A-166.
Upper Card:
Cover Buff Z-824.
Cover Reddish-Brown Z-825.
Lower Card:
Cover Yellowish-Brown Z-826.
Emerald Green No. 401.

Plate 23.

A Good Treatment of Red Cover-Stock.

STOCK: Chicago Paper Company Claret Aeolian Cover, 20½ x 25 — 65 pounds.

INKS: Cover Black No. 715.
Transparent Brown Z-822.
Yellow-Gold Z-821.

Plate 24.

An Example of Balanced Contrast.

STOCK: Chicago Paper Company White Aeolian Cover, 20½ x 25 — 65 pounds.

INKS: Cover Gray Z-807.
Cover Light Brown Z-808.
Cover Blue Z-809.
Cover Reddish-Brown Z-810.
Border Gray Z-811.

Plate 25.

An Example of End-Sheet Treatment.

STOCK: J. W. Butler Paper Company Buckeye Cover, French Gray, Antique Finish, 20 x 25 — 50 pounds, and 22 x 28½ — 60

INK: End-Sheet Green-Gray Z-815.

Plate 26.

Method of Conventionalizing Good Color Schemes.

STOCK: J. W. Butler Paper Company Dresden Pamphlet, China White.

INK: H. P. Dullo Black A-166.

Plate 27.

Illustration of Some of the Apparatus Used in Color Analysis.

STOCK: J. W. Butler Paper Company "Warren's" Cameo Plate Coated Book — Sepia, 25 x 28 — 90 pounds.

INK: Dullopaque Brown C-111.

Plate 28.

Solid Used for Estimation of Covering Capacity.

STOCK: The Paper Mills' Company Regal Antique Book, 25 x 38 — 80 pounds. White.

INK: Del Black. (NOTE.— In some of the sheets Process Black A-34 was used for this plate. It weighed .1225 gram as against .1187 for Del Black. The Process Black was inserted by mistake, but practically the only difference is one of lustre. A twenty-five cent book black does not possess the same density of color as a Process Black.)

Plate 29.

Covering Capacity of Black on Eight-Point Type. Antique Stock.

STOCK: The Paper Mills' Company Regal Antique Book, 25 x 38 — 70 pounds. White.

INK: Del Black.

Plate 30.

Covering Capacity of Black on Ten-Point Type. Antique Stock.

STOCK: The Paper Mills' Company Regal Antique Book, 25 x 38 — 70 pounds. White.

INK: Del Black.

Plate 31.

Covering Capacity of Black on Twelve-Point Type. Antique Stock.

STOCK: The Paper Mills' Company Regal Antique Book, 25 x 38 — 70 pounds. White.

INK: Del Black.

Plate 32.

Covering Capacity of Black on Eight-Point Type. Machine-Finish Stock.

STOCK: The Paper Mills' Company Herald Velvet Finish Book, 25 x 38 — 50 pounds. White.

INK: Del Black.

Plate 33.

Covering Capacity of Black on Ten-Point Type. Machine-Finish Stock.

STOCK: The Paper Mills' Company Herald Velvet Finish Book, 25 x 38 — 50 pounds. White.

INK: Del Black.

Plate 34.

Covering Capacity of Black on Twelve-Point Type. Machine-Finish Stock.

STOCK: The Paper Mills' Company Herald Velvet Finish Book, 25 x 38 — 50 pounds. White.

INK: Del Black.

Plate 35.

Covering Capacity of Black on Eight-Point Type. S. & S. C. Stock.

STOCK: The Paper Mills' Company A. Plate S. & S. C. Book, 25 x 38 — 60 pounds. White.

INK: Del Black.

Plate 36.

Covering Capacity of Black on Ten-Point Type. S. & S. C. Stock.

STOCK: The Paper Mills' Company A. Plate S. & S. C. Book, 25 x 38 — 60 pounds. White.

INK: Del Black.

Plate 37.

Covering Capacity of Black on Twelve-Point Type. S. & S. C. Stock.

STOCK: The Paper Mills' Company A. Plate S. & S. C. Book, 25 x 38 — 60 pounds. White.

INK: Del Black.

Plate 38.

Covering Capacity of Half-Tone Black on Enamel Stock.

STOCK: The Paper Mills' Company Diamond D Black and White Coated Book, 25 x 38 — 100 pounds. White.

INK: Lustre Black A-346.

Plate 39.

STOCK: The Paper Mills' Company A. Plate S. & S. C. Book, 25 x 38 60 pounds. White.

INK: Duplex Sepia No. 621.

Plate 40.

STOCK: The Empire Paper Company Special Enamel.

INK: Duplex Sepia No. 621.

Plate 41.

STOCK: The Paper Mills' Company Diamond D Black and White Coated Book, 25 x 38 — 100 pounds. White.

INK: Duplex Sepia No. 621.

Plate 42.

STOCK: The J. W. Butler Paper Company " Warren's " Lustro Superfine Coated Book, 25 x 38 — 100 pounds. White.

INK: Duplex Sepia No. 621.

Plate 43.

STOCK: The J. W. Butler Paper Company Snowflake Enameled Book, 25 x 38 — 80 pounds. White.

INK: Duplex Sepia No. 621.

Plate 44.

STOCK: Bermingham & Seaman Company Duotone Enamel, 25 x 38 — 75 pounds. White.

INK: Duplex Sepia No. 621.

Plate 45.

STOCK: The Paper Mills' Company Diamond D Superb Dull Finish Coated Book, 25 x 38 — 80 pounds. White.

INK: Duplex Sepia No. 621.

Plate 46.

STOCK: The J. W. Butler Paper Company " Warren's " Cameo Plate Coated Book, 25 x 38 — 90 pounds. Ivory White.

INK: Duplex Sepia No. 621.

Plate 47.

Four-Color Subject. From a Water-Color by Mr. Glen Sheffer, of the Jahn & Ollier Engraving Company.

STOCK: The J. W. Butler Paper Company " Warren's " Lustro Superfine Coated Book, 25 x 38 — 100 pounds. White.

INK: As indicated on progressive proofs.

Plate 48.

Yellow of Four-Color Subject.

STOCK: Indicated on finished proof.

INK: Process Yellow J-21.

Plate 49.

Red of Four-Color Subject.

STOCK: Indicated on finished proof.

INK: Process Red G-396.

Plate 50.

Four-Color Subject.

INK: Process Red over Yellow.

Plate 51.

Black of Four-Color Subject.

STOCK: Indicated on finished proof.

INK: Process Black A-34.

Plate 52.

Four-Color Subject.

INK: Process Black over Red and Yellow.

Plate 53.

Blue of Four-Color Subject.

STOCK: Indicated on finished proof.

INK: Process Peacock Blue No. 25295.

COLOR AND ITS DISTRIBUTION IN PRINTING

INTRODUCTION

As the purpose of this book is to supplement by actual color examples " Color and Its Application to Printing,"* rather than to cover the entire field anew, I must refer the reader to that work for detailed explanations. The terms hue, value and chroma, as used by Mr. A. H. Munsell in his " Color Notation," are to be found in a footnote, as well as the definitions of analogy, contrast, complement and balanced contrast.

HUE: " Color; specifically and technically, distinctive quality of color in an object or on a surface; the respect in which red, yellow, green, blue, etc., differ one from another; that in which colors of equal luminosity and chroma may differ."

VALUE: " In painting and the allied arts, relation of one object, part or atmospheric plane of a picture to the others with reference to light and shade, the idea of hue being abstracted."

CHROMA: " The degree of departure of a color sensation from that of white or gray; the intensity of distinctive hue; color intensity."

ANALOGY: Analogous colors; in the restricted sense in which the terms are used here, colors immediately to the right and left of a given color; thus, the analogous colors to red are yellow-red and red-purple.

CONTRAST: Contrasting colors; to set in opposition, as two or more objects of a like kind, with a view to show their differences. In the restricted sense here, the complement of a given color and the colors immediately to the right and left of it; thus, blue-green, the complement of red, green and blue are the contrasting colors to red.

COMPLEMENT: Complementary or antagonistic colors; those pairs of colors which when mixed produce white or gray light, in pigments those which produce black or gray.

BALANCED CONTRAST: A harmony of three or more colors where the second color is neither analogous nor contrasting to the first color

* NOTE.— Published in 1911 by The Inland Printer Co.

and the third color holds the second color in place, obviating the results of " simultaneous contrast." (See Chapter IX, " Color and Its Application to Printing.")

Where color is reproduced by colortype plates the printer has little to do with the color-scheme — the engraver must follow the artist and endeavor to reproduce the original as nearly as possible. It is only when printing from single half-tones and zinc plates (or electrotypes) that the printer has an opportunity to originate or improve a color-scheme. His province also is the selection of the proper stock. It is with these problems that this book deals.

IDEAL PROPORTIONS OF THE RECTANGLE

In advertising literature the rectangle most frequently is the form used. Its base should be less than its height and in some simple ratio to it: two to three, three to four, four to five proportions are often used, but the Greeks found the ideal proportion to be 1 to 1.618, which does not seem to be simple until we analyze how it was obtained. They found that the width should be to the height as the height is to the sum of the width and height — a : b :: b : a + b, and if " a " equals 1, " b " would equal 1.618. This proportion is called the Golden Section. To obtain uniformity I have tried to have all plates 4 inches in width, which applying the " Golden Section " would make the length 6.472, or a little less than 6½ inches. In figuring covering capacity I have taken 25 square inches as a basis, which would make the length of the plate 6¼ inches.

Plate 1 is an example of the ideal rectangle, with the decorative spot in exact balance. The eye is not drawn away from the type-matter by the decoration, nor does the stock claim attention, but design, stock and ink are so correctly selected that one realizes that the design possesses permanent beauty.*

*In the list of plates, paper and ink on page 3 will be found full information as to trade-name and manufacturer of stock and the name and number of the ink; also information regarding plates used in this book.

THE SELECTION OF STOCK AND INK

In Plate 2 a dull green-black is used on dull stock and for its purpose illustrates the same character of treatment as Plate 1. Naturally the advertising feature makes its appeal more transient. The Dullo Brown illustrated in Plate 3 in combination with the stock presents a simple analogy in color. I have purposely selected a plate, the lettering and details of which are of the same character as before, so that a comparison could be made of the color treatment. One does not care to use black at all times, or even dull green-black. Plate 3 is a change and will command attention, but if the catalogue is to be retained for a long period the previous color-scheme is a better one. In the same way colored stationery is effective as a change, but one feels that white stock year in and out is better than something more novel retained too long.

UNUSUAL HALF-TONE COLORS

In Plate 4 the subject demands unusual treatment, not in color but in quality, and the effect is obtained by the dull stock and Dullo Green-Black ink. In printing a half-tone such as Plate 5 with a solid background, the laying quality of the ink is of utmost importance. No matter how attractive the subject or color, the effect is ruined by the appearance of mottling in the background. The hue of the ink is in analogy with, and tones into, the hue of the stock. In value it may be said to be as much above black as the stock is below white. This shortening of the value scale at both ends, rather than using white stock with colored ink or colored stock with black ink, is a gain in effectiveness.

Compare Plate 6. The color of the ink is well suited to the subject and white stock is to be preferred, as stated above, to colored, but the final result is not quite so pleasing as the head of Liszt. This plate demonstrates that art subjects are an exception to the rule, and are not limited to conservative treatment in the same way as office stationery and merchandise advertising.

THE ADDITION OF DECORATIVE COLORS

In Plate 7 I have taken Plate 1, which was perfectly satisfying in black, and added color to illustrate that decorative colors must balance on a point midway between the value of the stock and black where black is the type-color. If we speak of black as zero in value and white as 100, the stock in Plate 7 is about 92, and the decorative colors, therefore, are 46.

In Plate 8 white stock is used. The decorative colors, therefore, are of 50 value, i. e., both are lighter than the colors in the previous plate. The use of red as a decorative color dates back to the early days of printing. Nowadays the advertiser demands it because he believes it has " attention-value." The word " value " here has a different meaning. Often the color-value is not correct, but the better grade of work shows that most printers realize that they must use a red of 50 value when using black for the type-color and white stock. Such a red is a light or yellow red. Frequently, also, " orange " is used, but seldom other colors.

In Plates 7 and 8, granting that we are going to add color where it is not necessary, we ought to at least use as little as possible of the high-chroma red. Notice how much the small spot of red is in evidence. This small area is large enough. The green, although of a lower chroma, has too much area. It would be better if we had selected a lower chroma still, but then the leaves would have lost their suggestiveness. They would not appear as we see leaves printed. Sometimes it is difficult for the printer of average experience to limit the decorative color to the exact area required for balance. In Plate 9 too much red is used, but, taking the drawing as it is, the arrangement of the lettering for color distribution presented a difficult problem for the student. Without the picture at the top the distribution of red in the greeting might have been " H " in Holiday, "A" in Apprentices, " L " in Lakeside, the holly leaf and " M " in MCMXV, but with the weight of the unbroken black in the sketch above, such a distribution would give too little

red. Naturally, then, the distribution illustrated was the decision. The card as a whole is very creditable, and shows what is being done in Mr. T. E. Donnelley's School for Apprentices, under the direction of Mr. Sheldon.

EXAMPLES OF MORE UNUSUAL DECORATIVE COLORS

Plates 10 to 14 suggest how purple and dark yellow-reds (reds of low chroma) may be used instead of high-chroma red or "orange" as decorative colors. Any color may be used as a decorative color, or to be more exact, a color may be selected of any hue for a decorative color provided the value is correct. The tendency in the use of decorative colors is to use too large an area, especially when the color possesses a high chroma.

Plate 15 illustrates the use of green as a decorative color with black ink on white stock. The possibilities of green are so varied that it is to be regretted that it is not used more often for decoration. There are yellow-greens of high chroma, pure greens, blue-greens, and that large family of greens of low chroma, the olives. Fifty plates would be necessary to illustrate the possibilities of this color in varied distributions.

SIMPLE ANALOGY

Plate 16 demonstrates the use of two greens printed on gray-green cover-stock. The form of the decorative color is somewhat distracting and the stock is not in the exact value that would give the most perfect balance, yet the effect as a whole is pleasing. Ideal conditions would be a 50-value stock with the possibility of printing the decorative color so that it would have a value of 70 with the type-color of 30 value. Granting that the type-color should be a decided green, the area of the decorative color in the design should be increased so that with its necessarily low chroma it would make up in area what it lacked in chroma. The areas of the two colors should be in inverse proportions to their chromas;

viz., balance six square inches of a 30-chroma color against three square inches of a 60-chroma color. Notwithstanding that Plate 16 will not bear this analysis, it is still very acceptable as a cover-design.

TWO COLORS, ONE IN ANALOGY WITH THE STOCK, THE OTHER IN CONTRAST

In Plate 17 a yellow-red of low chroma (brown) takes the place of green for type. This contrasting yellow-red has practically the same chroma as the green — it is just as strong or brilliant and is also of the same value. There are some who would like this color-scheme better than that of Plate 16, but to me a contrasting color emphasizes any possible incorrect balance of the areas in chroma, as well as the inequalities of the value steps. For the novice the analogy is the surest road to harmony.

In Plate 18 the brown decorative color is in analogy with the stock, and the type green is in contrast to it. Here we have an ideal distribution of colors similar to those used in Plate 17. The balance is so exact that if we were to increase the area of the brown in the decorative spots in the heading or at the bottom (i. e., by making them more solid), we would have to use a more neutral brown (lower in chroma) in order to again produce the ideal balance.

HARMONY BY CONTRAST

In Plate 19 the green and purple suggest the character of business that the booklet advertises. It was printed by the Press of the Fruit Grower, St. Joseph, Missouri, and it is such a good cover that it is to be regretted that hand-lettering, conforming to the character of the design, was not used instead of type. It is a good example of a contrasting color-scheme, with the areas of the two colors adjusted to their respective chromas. Notice that on the border the higher value purple was used for the four outer lines in order to increase the area of that color.

MORE COMPLEX ANALOGIES

Plate 20 is a yellow analogy, although it does not appear so at first glance. The decorative yellow is the middle of the group of colors; on the warm side the stock and type-color are yellow-red, and on the cool side dark yellow-green is used for the other decorative color. This is a very attractive example of the use of color for type and decoration.

Plate 21 is another type of an elaborate analogy, with the addition of a neutral gray to accentuate the design. The form is novel and for the purpose very acceptable. As a rule, the square is not a desirable form to use in advertising, but when used the base should be three per cent greater than the altitude. This apparent inequality is necessary in order to make the figure appear square. The muscles of the eye which control vertical movement do not permit of such unconscious use as those which move the eye from side to side. It requires more effort to look up and down than sideways, so that distances up and down seem greater.

UNUSUAL DECORATIVE COLORS WITH BLACK

The upper card in Plate 22 illustrates again the use of a decorative color midway in value between the stock and black, and demonstrates also that in order to gain effectiveness it is not necessary to have an extra color much in evidence. The card would be spoiled if the buff under the leaves was also used in the type-matter. The lower card is bizarre in treatment and color, but it fits the occasion. An invitation to the distribution of prizes at a printing-school is not limited by the same conventions as advertising matter. The card as sent out was not the exact shape shown, and in setting it into the page too much margin appears at the top.

TREATMENT FOR RED COVER-STOCK

Red stock is very difficult to handle satisfactorily and Plate 23 shows a type of treatment which is always successful. Avoid brilliant colors — the stock itself furnishes the

attraction; use black for type, an analogous color to blend the central line or decorative spot into the stock, and gold to give richness to the whole. This is a good formula. In this example yellow was added to the gold in order to take away its " newness " and give it the appearance of age.

HARMONY BY BALANCED CONTRAST

Plate 24 is an example of balanced contrast, in that the gray tint around the decorative spot in the center is used to prevent the color of the stock from changing the appearance of the blue by simultaneous contrast. The yellow in the spot would tend to make the blue appear as its complement, purple-blue, but the yellow-red (brown) in the center would help to keep it *blue,* as the complement of yellow-red is blue. However, notwithstanding the aid of the yellow in the design, if the stock could act directly on the spot of blue it would make it appear purple-blue, owing to the large area of stock surrounding it. The gray ring prevents this.

END-SHEET TREATMENT

End-sheet colors should be always in close analogy to the color of the stock, not only in hue but also in value and chroma. In Plate 25 I have made the color stronger than that required for most decorative end-sheets in order to bring out the variety of the design, which since it is made up of various printers' trade-marks is interesting to many of the readers of this book.

METHOD OF CONVENTIONALIZING GOOD COLOR-SCHEMES FOR FUTURE USE

Plate 26 is 4 by 6¼ inches, or 25 square inches. Each of the triangles has an area of ¼ square inch, or one per cent of the area of the rectangle, and each of the small oblongs an area of ⅛ square inch, or one-half per cent of the total area. The design is arranged with the idea of using the small oblongs for the small areas of the high-

chroma colors, which in cover-designs are usually located in the approximate position indicated. For those who are seriously interested in the subject of the distribution of color in printing, this plate will have more interest than if it were printed in many colors. By means of such an arrangement in percentages one may preserve the analyses of good color-schemes in a form which admits of instant application to some new job having the same number of colors in approximate areas. Duplicate electrotypes of this plate may be had from The Inland Printer Co., and they also keep a supply of sheets printed with this plate on hand, so that you may either print your own sheets on suitable stock or order them already printed. If you print them yourself, use the lightest possible gray, so that the outlines of the plate will not interfere with the color-scheme you are recording. In filling in the design the best medium to use is printing-ink, in order to avoid the additional adjustment of matching water-colors when the job goes on the press. Tap the colors in the triangles with the finger, using a triangular and oblong mask cut from heavy bond-paper. The conventionalizing of a design as complicated as the frontispiece* is not at all difficult if you use a planimeter in measuring the areas. In order to change the chroma or value of a color in fitting a successful color-scheme to new conditions, it would pay every printer to have on his desk one of Munsell's Color Atlases. Five fundamental hues, and on some of the charts ten, are shown in various values and in decimal steps of chroma, so that when applying the rule that chroma should be inversely proportional to the area the printer may see exactly the strength of color he must use in order to obtain balance. This Color Atlas, containing 688 colors, is for sale by the Wadsworth-Howland Co., Boston, Massachusetts, or Favor, Ruhl & Co., 425 South Wabash avenue, Chicago.

*The original poster of this plate was printed from linoleum plates with the exception of the black. These linoleum plates were made by engraving a heavy piece of linoleum mounted on a wood block, and the development of this process is due to Mr. Wm. E. Rudge, of New York. It is especially adapted for broad effects and rather coarse lines on rough paper. The ductility of the linoleum yields readily to the unevenness of the surface of this character of stock.

THIS · IS · TO · CERTIFY · THAT

EMORY COBB ANDREWS

HAVING · PAID · THE · SUM · OF
ONE · HUNDRED · DOLLARS
INTO · THE · TREASURY · OF
THE · ART · INSTITUTE · OF · CHICAGO
IS · ENTITLED
TO · ALL · THE · PRIVILEGES · OF
LIFE · MEMBERSHIP
UNDER · THE · BY-LAWS · OF
THE · ASSOCIATION

CHICAGO - NOV - 12 - 1915

PRESIDENT

SECRETARY

PLATE 1.

Marshall Field & Co.

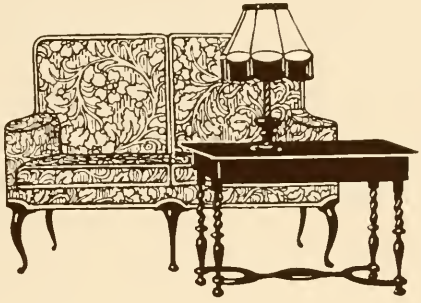
INTERIOR DECORATIONS & FURNISHINGS

Our Interior Decorating and Furnishing Service enables our customers to choose conveniently and wisely, with the aid of expert general salesmen, from our unsurpassed stocks of foreign and domestic decorations and furnishings.

We maintain a complete organization for all work pertaining to the interiors of residences. Authoritative advice, without charge, is part of this service.

You are invited to bring your problems to our general salesmen on the Fifth Floor.

Consulting with us involves no obligation on your part.



Marshall Field & Co.

INTERIOR DECORATIONS
& FURNISHINGS

Our Interior Decorating and Furnishing Service is an unusual, co-operative, helpful, personal Service in Home Furnishing—for which there is no charge.

It is a tremendous advantage for you to choose all the materials for the decorating and furnishing of your home in one place — dealing with one person, one of our general salesmen.

This Service focuses the experience and power of this world-wide organization upon your individual problems. We co-operate with you in all details.

You are invited to consult with our general salesmen on the Fifth Floor.

PLATE 4.

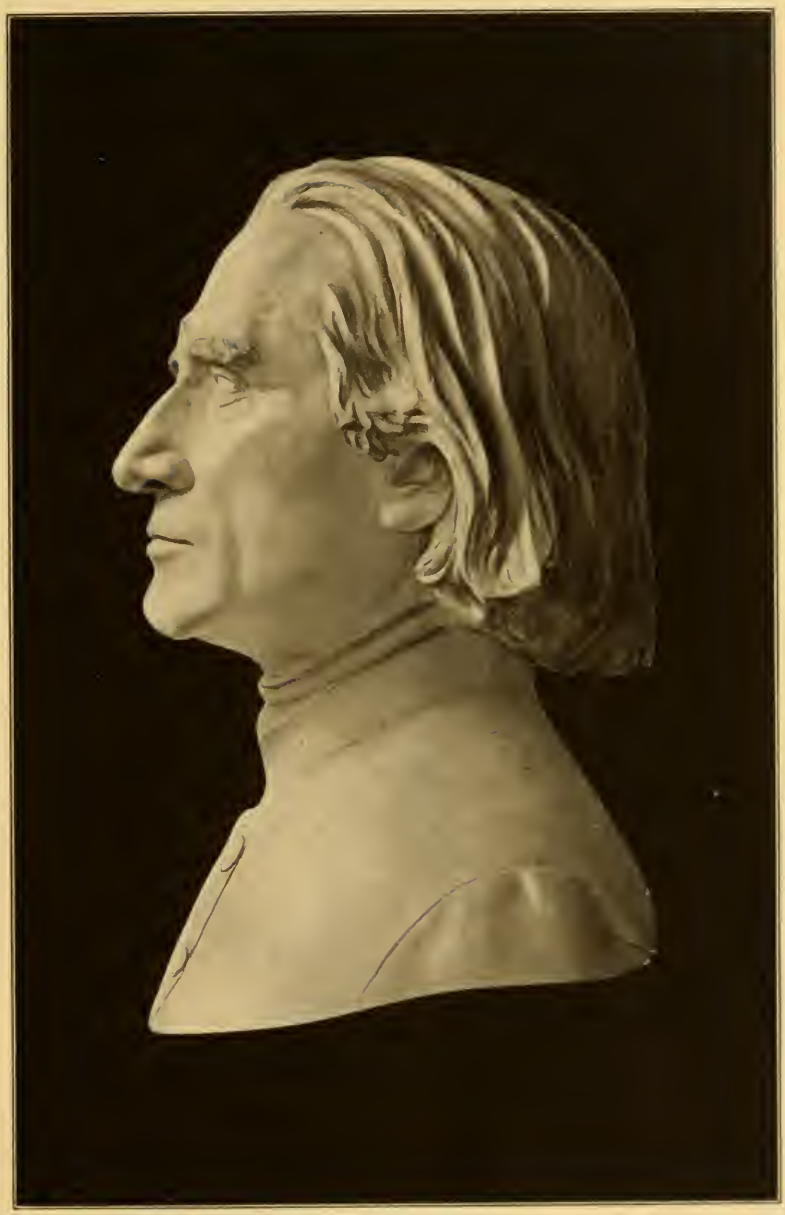


PLATE 5.

209 PAU. -- La Femme au Puits (Gabard, Statuaire). - LL.

PLATE 6.

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LIFE · MEMBERSHIP
UNDER · THE · BY-LAWS · OF
THE · ASSOCIATION

CHICAGO - NOV - 12 - 1915

PRESIDENT

SECRETARY

Plate 7.

THIS · IS · TO · CERTIFY · THAT

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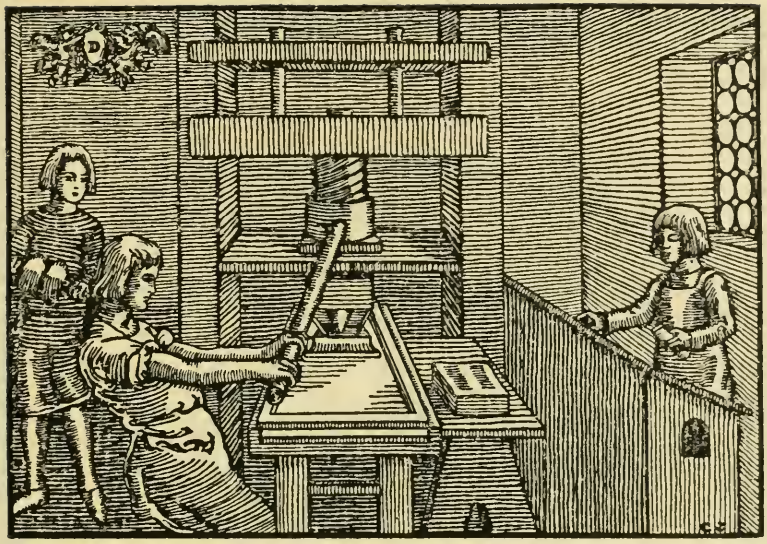
LIFE · MEMBERSHIP
UNDER · THE · BY-LAWS · OF
THE · ASSOCIATION

CHICAGO · NOV · 12 · 1915

PRESIDENT

SECRETARY

PLATE 8.



Holiday Greetings from
the School for Apprentices
of The Lakeside Press
Chicago Illinois
Christmas MCMXV

PLATE 9.

EXAMPLES OF WORK

PRODUCED BY STUDENTS ATTENDING THE ST. BRIDE FOUNDATION PRACTICAL PRINTING CLASSES

SESSION 1913-14

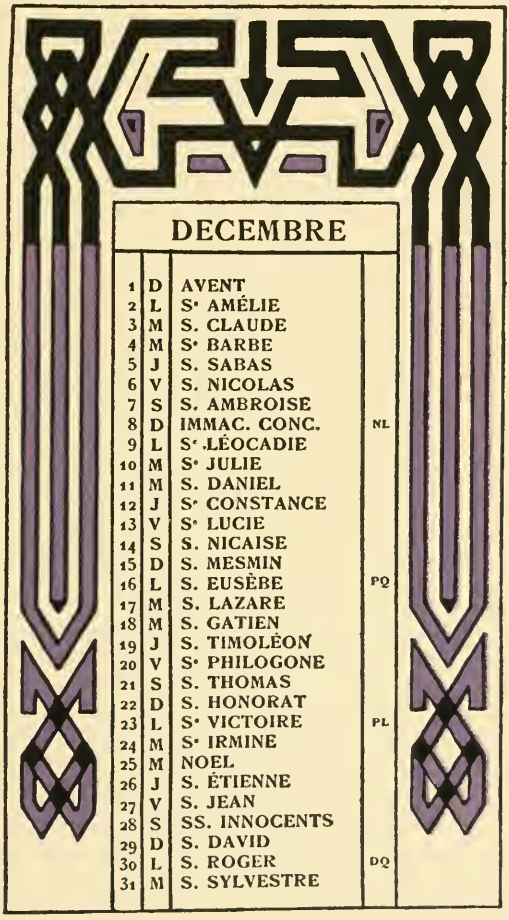

DECEMBRE
1 D AVENT
2 L S• AMÉLIE
3 M S. CLAUDE
4 M S• BARBE
5 J S. SABAS
6 V S. NICOLAS
7 S S. AMBROISE
8 D IMMAC. CONC. NL
9 L S• LÉOCADIE
10 M S• JULIE
11 M S. DANIEL
12 J S• CONSTANCE
13 V S• LUCIE
14 S S. NICAISE
15 D S. MESMIN
16 L S. EUSÈBE PQ
17 M S. LAZARE
18 M S. GATIEN
19 J S. TIMOLÉON
20 V S• PHILOGONE
21 S S. THOMAS
22 D S. HONORAT
23 L S• VICTOIRE PL
24 M S• IRMINE
25 M NOEL
26 J S. ÉTIENNE
27 V S. JEAN
28 S SS. INNOCENTS
29 D S. DAVID
30 L S. ROGER DQ
31 M S. SYLVESTRE

Plate 11.

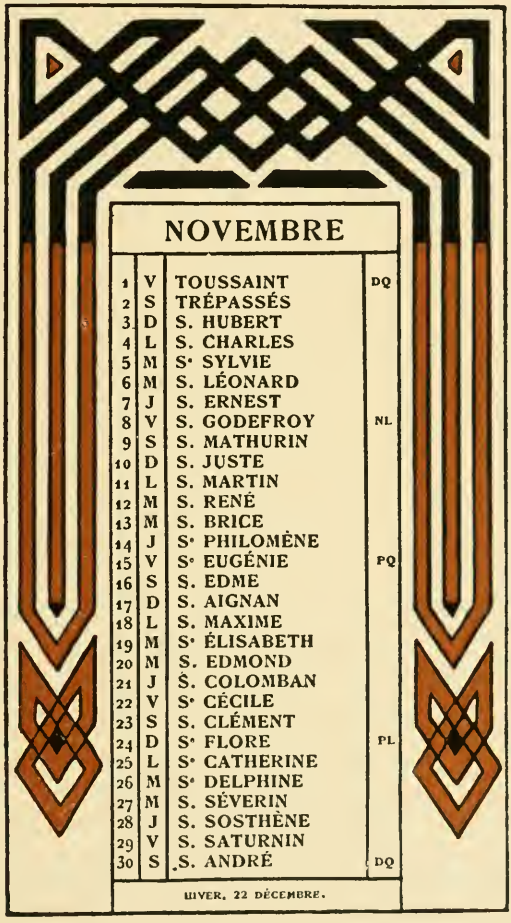

NOVEMBRE
1 V TOUSSAINT DQ
2 S TRÉPASSÉS
3 D S. HUBERT
4 L S. CHARLES
5 M Ste SYLVIE
6 M S. LÉONARD
7 J S. ERNEST
8 V S. GODEFROY NL
9 S S. MATHURIN
10 D S. JUSTE
11 L S. MARTIN
12 M S. RENÉ
13 M S. BRICE
14 J Ste PHILOMÈNE
15 V Ste EUGÉNIE PQ
16 S S. EDME
17 D S. AIGNAN
18 L S. MAXIME
19 M Ste ÉLISABETH
20 M S. EDMOND
21 J S. COLOMBAN
22 V Ste CÉCILE
23 S S. CLÉMENT
24 D Ste FLORE PL
25 L Ste CATHERINE
26 M Ste DELPHINE
27 M S. SÉVERIN
28 J S. SOSTHÈNE
29 V S. SATURNIN
30 S S. ANDRÉ DQ
HIVER. 22 DÉCEMBRE.

PLATE 12.

Yrkesskolan för Bok=hantverk i Stockholm

MEDDELAR PRAKTISK OCH TEORETISK
UNDERVISNING ÅT BOKTRYCKERIELEVER

BILAGA TILL NORDISK BOKTRYCKARE-
KONST, SATT OCH TRYCKT
I YRKESSKOLAN FÖR
BOKHANTVERK
STOCKHOLM

STOCKHOLM 1910

Plate 13.

VÉLIN DORÉ

Vieux maître relieur, l'or que tu ciselas
Au dos du livre et dans l'épaisseur de la tranche
N'a plus, malgré les fers poussés d'une main franche,
La rutilante ardeur de ses premiers éclats.

Les chiffres enlacés que liait l'entrelacs
S'effacent chaque jour de la peau fine et blanche;
A peine si mes yeux peuvent suivre la branche
De lierre que tu fis serpenter sur les plats.

Mais cet ivoire souple et presque diaphane,
Marguerite, Marie, ou peut-être Diane,
De leurs doigts amoureux l'ont jadis caressé;

Et ce vélin pâli que dora Clovis Ève
Évoque, je ne sais par quel charme passé,
L'âme de leur parfum et l'ombre de leur rêve.

J.-M. DE HEREDIA.

Der englische Illustrator und das Buch.

Wir rühmen uns, und zwar mit Recht, einer wiederauflebenden Entwickelung des Buchschmuckes. Nach einer langen Epoche kläglicher Verkommenheit, die einem auf den seichtesten Geschmack der Massen spekulierenden Handwerk das Feld völlig geräumt hatte, regt sich jetzt wieder der Gedanke, ob es nicht würdiger sei, ein poetisches Werk mit wirklich künstlerischer Erkenntnis seiner Gedanken schmückend zu gestalten. Es ist uns wieder voll und ganz aufgegangen, daß in erster Linie doch gerade das Buch ein Bildungsmittel des Menschen ist — in vielen Fällen sogar das einzigste — das schon von Jugend auf als ein köstlicher häuslicher Gesell die Kunsteindrücke in uns zu kräftigen und eine reine, erhebende Freude an großen und schönen Gedanken zu gewinnen vermag, das uns von seiner Lektüre hinaus in die Welt sinnen und träumen läßt, nicht nur von den Vorgängen und Geschehnissen längst begrabener Geschlechter, sondern auch von dem Denken und Sinnen der volksbildenden Kraft unserer eigenen Zeit. Von solchen Betrachtungen ausgehend, haben in den letzten Jahrzehnten unsere Künstler das Fruchtbare dieses Gebietes für ihre Tätigkeit von neuem erkannt und mit schönem Eifer versucht, die

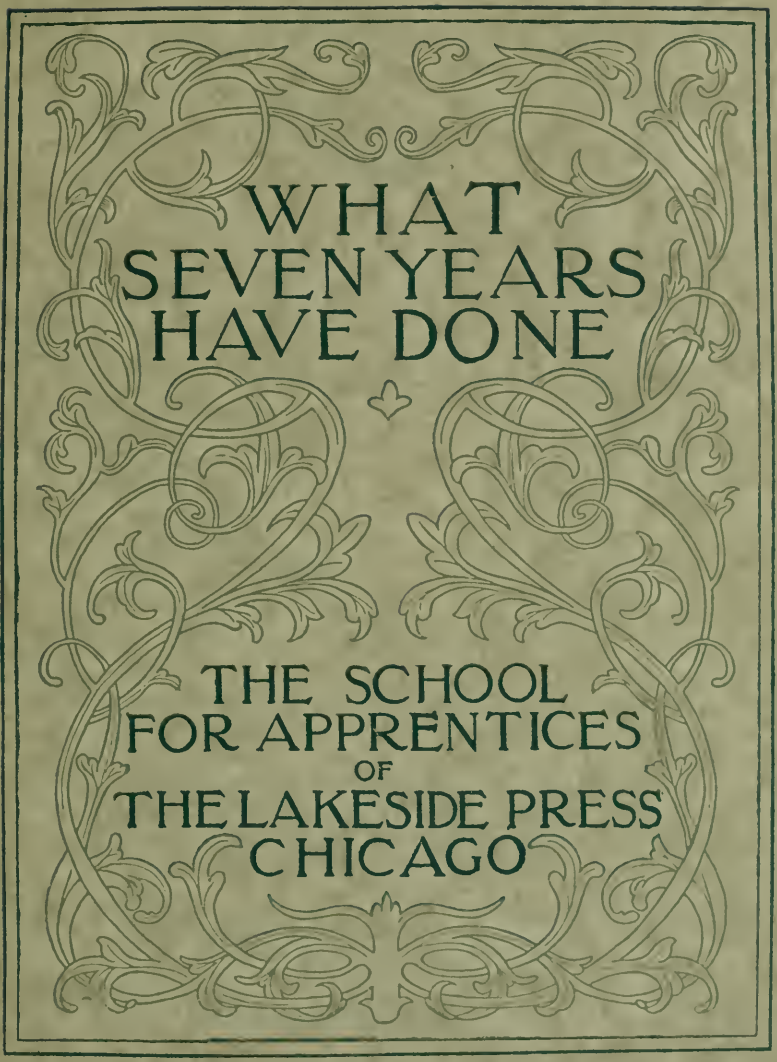

WHAT
SEVEN YEARS
HAVE DONE
THE SCHOOL
FOR APPRENTICES
OF
THE LAKESIDE PRESS
CHICAGO

PLATE 16.

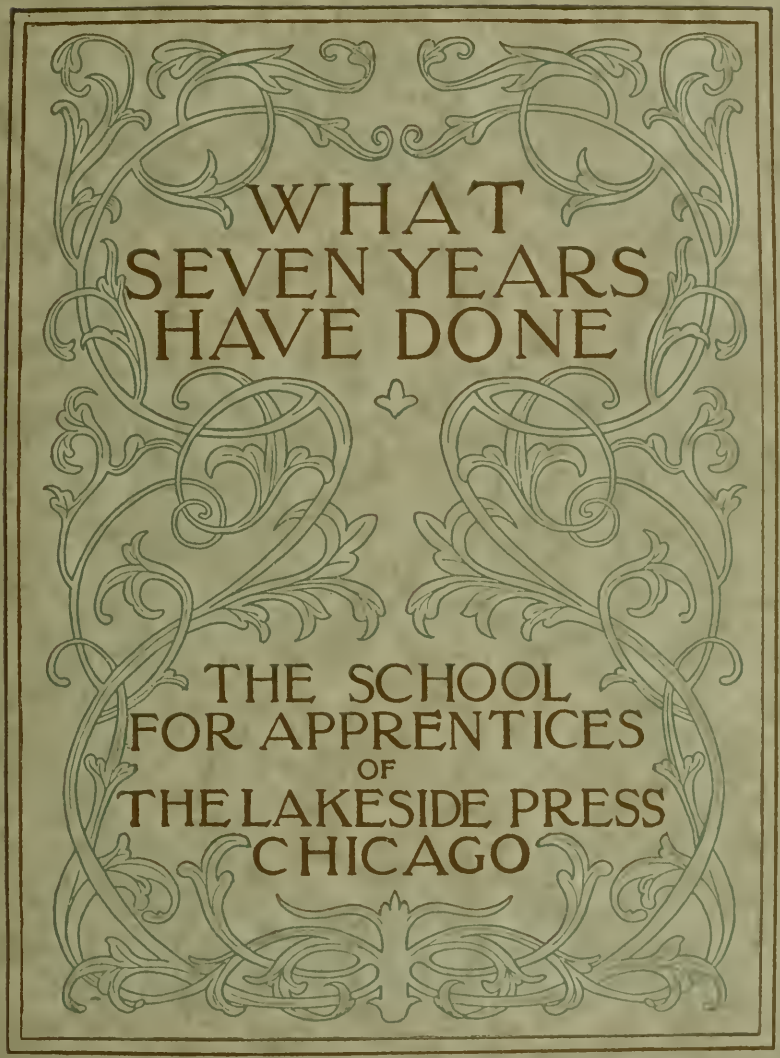

WHAT
SEVEN YEARS
HAVE DONE
THE SCHOOL
FOR APPRENTICES
OF
THE LAKESIDE PRESS
CHICAGO

PLATE 17.

Joseph Reichenberger

Nippes und Glaswaren
Porzellan-Manufaktur
Steingut und Majolika

Waldheim in Sachsen
Kaufingerstraße 14, 1. Stock

Plate 18.

Lily of the Valley
Specialist

Ben S. Westheimer

Hardy Plants and Shrubs

SAINT JOSEPH, MISSOURI

PLATE 19.

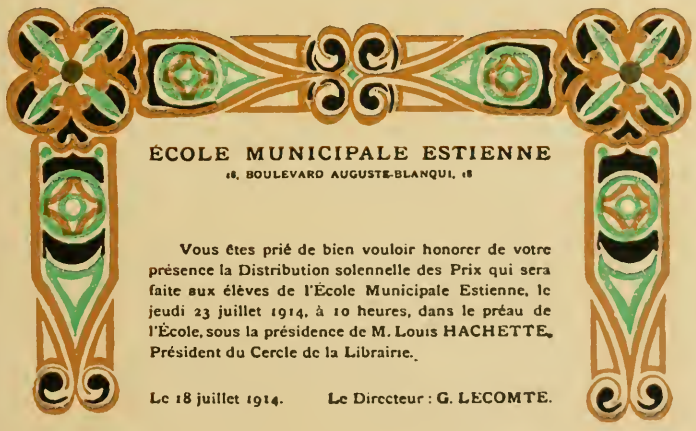
APRES avoir enseigné la vie, les livres nous en consolent. Lisez donc. Les sages qui ont écrit avant nous sont des voyageurs qui nous ont précédés dans les sentiers de l'infortune, qui nous tendent la main et nous invitent à nous joindre à eux quand tout nous abandonne. Lisez donc. Un bon livre est un legs qu'un homme de génie fait au genre humain.

Vignettes composées et photogravées, composition du texte et impression par les eleves de l'école municipale Estienne — Année 1906.

Plate 21.

Le Directeur, le Personnel et les Élèves de l'École Estienne présentent leurs hommages et leurs meilleurs souhaits à M^r^.

1^er^ Janvier 1913



ÉCOLE MUNICIPALE ESTIENNE

18, BOULEVARD AUGUSTE-BLANQUI, 18

Vous êtes prié de bien vouloir honorer de votre présence la Distribution solennelle des Prix qui sera faite aux élèves de l'École Municipale Estienne, le jeudi 23 juillet 1914, à 10 heures, dans le préau de l'École, sous la présidence de M. Louis HACHETTE, Président du Cercle de la Librairie.

Le 18 juillet 1914. Le Directeur : G. LECOMTE.

Composition et exécution par les élèves

PLATE 22.

RAYMOND POINCARÉ

L'IDÉE DE PATRIE

TYPOGRAPHIE DE L'ÉCOLE MUNICIPALE ESTIENNE
18, BOULEVARD AUGUSTE-BLANQUI, 18. PARIS-XIIIe ARRONDISSEMENT

ÉCOLE MUNICIPALE ESTIENNE

ARTS ET INDUSTRIES DU LIVRE

1914

ATELIERS AYANT COLLABORÉ A LA CONFECTION DE CE CALENDRIER

COMPOSITION DÉCORATIVE = Illustrations décoratives, Armes et Firme
GRAVURE SUR BOIS = COMPOSITION TYPOGRAPHIQUE = IMPRESSION TYPOGRAPHIQUE

Plate 25.

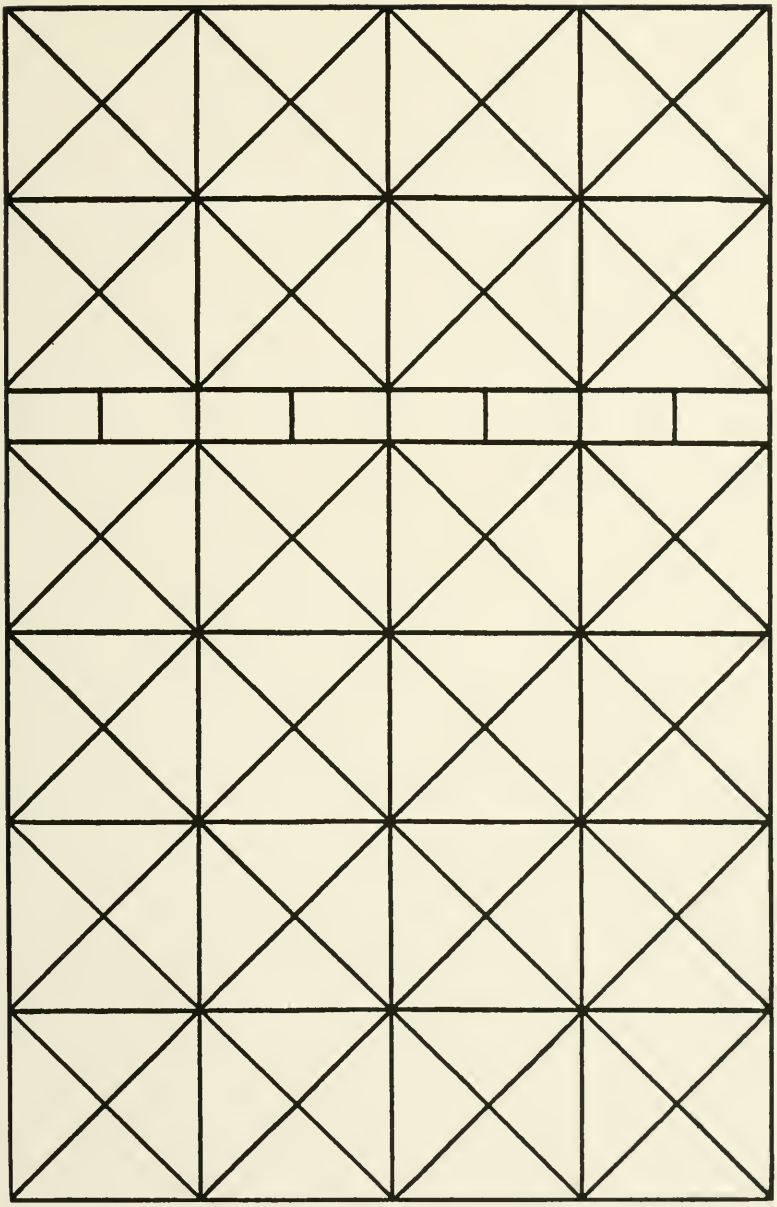


Plate 26.

PHILIP RUXTON, INC.
200 BROADWAY, NEW YORK
101 WEST HARRISON ST.
CHICAGO

PLATE 27.

HOW TO ESTIMATE INK

My interest in this subject was first aroused when taking some friends from out of town to visit the pressroom of one of our large dailies more than ten years ago. I asked the night foreman how many pounds of ink it took to print a thousand newspapers, but he was unable to give me accurate information. Later I asked this question of others, and one man gave me the facts in the form I had expected. It was Mr. Lester L. Jones, of the *Journal:* "On an eight-column paper the sheet is 18¼ x 23½, with a printing surface of 17 x 21½, 365 square inches, or about 3,000,000 square inches for a thousand eight-page papers. The ink runs between one and two pounds, depending on the stock." In discussing covering capacity with various printers, I found that few of them figured the ink in estimating on a square-inch basis. It was a case of comparing one job with another, a guessing not only of the covering capacity of the ink but of the area itself. One man used 133,000 square inches per pound on all jobs and inks as the covering capacity of one pound of material; another, 100,000. Imagine the surprise of these gentlemen if they had figured on a certain school-supply catalogue which had a black cover with the design in white. It happened to be comparatively easy to measure the area, but for the first impression only it took four times the amount they would have figured. The most complete list of covering capacities I found in use in a private label plant where they used but one stock. The list was as follows:

	Thousands of Square Inches Per Pound.
Solid Black	130
Bronze-Blue	120
Purple	120
Blue Lake	180

	Thousands of Square Inches Per Pound.
Milori Blue	260
Alkali Brown	160
Milori Green	140
Transparent Tints	200
Red	120
Margo Yellow	90
Gold Size	100
Azure Blue	180
Green Lake	180

Bronze takes 2½ times the weight of the size.

At a glance there are errors in this list; for example, the covering capacity of Milori Blue compared to Bronze-Blue, but many of the figures are quite accurate. At any rate, this superintendent had tried to classify his information regarding inks, and no doubt some errors were to be expected from faulty measurement. Let us consider a moment this feature of estimating ink.

HOW TO MEASURE THE SQUARE INCHES IN A JOB

Regular solids, such as rectangles, are easily measured with a rule; triangles, by drawing a rectangle about them and by subdividing the rectangle with other lines, are easily measured in part or whole as one-half the area of the surrounding rectangle; solid circles, by multiplying the square of the diameter by .7854; and irregular solids, by means of an instrument called a planimeter, sold by Keuffel & Esser Co., which gives the area in square inches by simply tracing the outlines of the solid.

Next, the number of square inches of type must be measured and this result multiplied by the percentage that type bears to solid on that stock. Then mixed display type and illustration multiplied by its percentage of solid and the half-tone area reduced to terms of solid are added to the area of the solids and type-matter. This gives the total area of the printing surface of the job, and if we know the number of thousand square inches that one pound of the ink

covers on *our* stock the estimate is no longer guesswork. As the measurement of small type-faces even with a planimeter is out of the question, the method of obtaining relative areas of type, mixed display type and illustration and half-tones is by weighing.

THE BALANCE USED

Weighings of this nature may be made on a chemist's analytical balance, such as are used in laboratories and colleges, but these stock balances are so sensitive that a weighing of more than 50 grams is not desirable. One sheet of 25 x 38 — 100 enamel weighs one-fifth of a pound, or more than 70 grams. Not only could this sheet not be weighed on a stock scale without damaging it, but owing to the glass back it would be impossible to balance it on the pan. For that reason I ordered the scale shown in Plate 27 made to order in Germany. The glass doors, both front and back, are removable. It has a capacity of 500 grams and a sensitiveness of a miligram. Some reader may ask why I did not use the " Decimal Parts of a Pound " system advocated in " Color and Its Application to Printing." Only because there have been no accurate weights made in this system smaller than thousandth parts of a pound, which is 453 milligrams, and it is very expensive having these small weights made to order.

Also shown in Plate 27 is an Ives daylight producer, immediately in front of the balance, and at the right an Ives colorimeter. The former is a cabinet with a gas mantle at the top and two filters below, standardized with each other, one violet and one crackled green. The light produced is almost perfect daylight, something that Ives could never obtain from an electric light. The colorimeter is an apparatus for matching colors in terms of light, and neither it nor the daylight producer have anything to do with the estimation of ink; but if I may digress a moment longer I should like to call your attention to a new use for the electric hair-dryer on the table — that of drying ink " tap-outs."

To return to the subject of the measurement of the covering capacity of type-faces by means of weighing. First we must get the weight of a solid black (or color) of the exact area of the type-face we expect to weigh.

METHOD OF DETERMINING COVERING CAPACITY BY WEIGHING

Plate 28 is a solid 4 by 6¼ inches, or 25 square inches. It is printed on antique stock and the ink on that page weighs .1187 gram. Of course this is the average weight. This copy may be a trifle light or a trifle heavy. It is much more difficult to obtain an equal distribution on a press than to weigh accurately on the balance. The same solid printed on machine-finish stock, such as used for Plates 32 to 34, weighs .0839 gram, and on S. & S. C. stock (Plates 35 to 37), .0515 gram. Since S. & S. C. stock is probably used by every printer, and since it gives the highest covering capacity of any paper excepting certain enamels, I will take this stock as a basis and show how I arrived at the figure .0515 gram as the weight of the ink used to print a solid 4 by 6¼ inches.

The S. & S. C. stock, as well as all other stocks used in estimating covering capacity of various inks, were cut 7 by 9½ inches. The packages were opened and the stock exposed for a number of days in order to avoid loss of moisture at the time the weighings were made. The temperature and humidity were the same in the pressroom and the room adjoining, containing the scale. It is evident that it is impossible to make weighings immediately after a storm or the first bright day after a damp week and expect to have them accurate. With the weather auspicious and the S. & S. C. stock properly seasoned, the balance was tested to see that the swing was correct and a weighing was made of a known weight. Then ten sheets of the 7 by 9½ inch stock were selected and marked "A," another ten marked " B," and a third ten marked " C," etc. The press was then started and fifty or a hundred sheets were run to be sure that the quantity

of ink was correct. The trial weighing of "A" was made, the sheets immediately* printed and instantly reweighed, the difference giving the weight of the ink.

"A"	37.350	grams, weight of stock and ink.
	36.870	grams, weight of stock.
	.480	grams, weight of 250 square inches of Del Black.

Upon examination, trial weighing "A" showed that the stock was not quite covered with the ink. The fountain of the press was opened a little, fifty sheets more were run to be sure of an average color and weighing " B " was made.

" B "	37.020	
	36.505	
	.515	

The color of " B " seemed to be correct and the weighing of " C" followed with the press running on try-sheets of the same S. & S. C. stock during the weighing of " B "' so that the ink would have no chance to dry on the press.

" C "	37.280	
	36.765	
	.515	

* One day the conditions were so perfect that with M. F. stock no change in weight was shown in fifty minutes, weighings made every ten minutes, but as a rule it is not safe to allow more than three or four minutes to elapse. After printing, haste is doubly necessary, as ink loses weight in drying. At the same time the above test was made on blank stock, a duplicate test was made on printed stock with the following results:

PLATE 33.— Ten sheets M. F. blank stock. Weight of black ink on 250 square inches, ten-point type.

1:40 P.M.	32.199	1:55 P.M.	32.192	2:05 P.M.	32.190
	32.120		32.120		32.120
	.079		.072		.070
2:30 P.M.	32.193	3:15 P.M.	32.202	5:30 P.M.	32.175
	32.120		32.120		32.120
	.073		.082		.055

Note the curious gain in weight between 2:05 P.M. and 3:15 P.M., and the final lowest weight at 5:30 P.M. An attempt at explanation would involve a chemical analysis of the ink itself, which probably would be of little interest to printers.

Since " B " and " C " give the same result, we are reasonably sure of the accuracy of our weighings. Sometimes it was necessary to make as many as six or seven weighings to be sure that our results were average ones, and in the lists of covering capacities the results have been rechecked not only as to weighing but as to figuring. There are at least three weighings to every color.

The question is now to convert our result into covering capacity per pound of ink in terms of thousand square inches.

For example:

If 250 square inches weigh .515 grams, 1,000 square inches would weigh 2.060 grams.

1 pound equals 453.592 grams.

In order to get the weight of 1,000 square inches in pounds, we must divide 2.060 by 453.592, which gives .00454152 pound. This long figure could be used to figure covering capacity, but our result was not in the form we desire it. The problem is simple. If .00454152 pound covers 1,000 square inches, how many square inches will one pound cover? We divide 1,000 by .00454152, which gives 220190.6 square inches as the covering capacity of one pound of Del Black on S. & S. C. stock. For practical purposes 220000 is close enough, but I carried the divisions out to the last point in order to get this one weighing as perfect as possible, because from it will be derived all other covering capacities by simple proportion. With logarithms the problem we have just done is a matter of a moment, but simple division is something with which all printers are more familiar. Before we are ready for our one division in order to figure out other tests, we must get our dividend by proportion.

If we let the covering capacity of an unknown be represented by " X," and the weight in grams of this same unknown by " Y," we have the following proportion:

$$.515 : Y :: X : 220190$$

.515, the weight of ink on 250 square inches on S. & S. C., is to Y the weight of ink on 250 square inches on some other stock as X, the covering capacity of the other stock is to

220190 the covering capacity of the ink just tested. It follows that

$$X = \frac{.515 \times 220190}{Y}$$

Multiplying .515 by 220190 we have 113397.85. Therefore

$$X = \frac{113397.85}{Y}$$; or, to make it more simple,

$$X = \frac{113400}{Y}$$

Let us try an example. I stated that the ink on Plate 28 weighed .1187 gram. Therefore ten sheets like Plate 28 would weigh 1.187 grams. Divide this number into 113400 and we have 95534, roughly 95000, as the covering capacity of Del Black on antique stock. Again, this solid on M. F. stock weighs .0839 gram — on ten sheets .839 gram — which gives 135160, practically 135000, as the covering capacity of Del Black on M. F. stock. In figuring other covering capacities I will give the results in even thousands of square inches, as less than 1,000 inches is a negligible quantity. In this example it would be less than one per cent, a variation much less than the accuracy of the distribution of the press, and in dollars and cents less than $10 on $1,000 worth of ink.

PERCENTAGE OF INK REQUIRED BY TYPE-MATTER AS COMPARED TO SOLIDS

Plate 29 illustrates 25 square inches of 8-point type on antique stock printed with the same Del Black shown on the solid of Plate 28. The ink weighs .135 gram for 250 square inches, giving a covering capacity of 840,000 square inches to the pound. The relation of 8-point type to solid on this stock is therefore $\frac{135}{1187}$, or 11.4 per cent — 11 per cent in even figures.

Plate 30 illustrates 10-point type on the same stock. It weighs for ten sheets .110 gram, showing a covering capacity of 1,030,000 square inches, or 9 per cent solid.

Plate 31, in 12-point type, weighs .080 gram for 250 square inches, a covering capacity of 1,417,000 square inches, or 7 per cent solid.

Antique Stock

To sum up, we have now the following facts regarding antique stock. We must figure 95000 square inches as the covering capacity for one pound of 25-cent Book Black, and knowing the number of square inches in the job we are estimating (or the square inches in a thousand copies, a hundred copies or one copy, depending on the size of the job estimated), we have only to divide the square inches in the job (in thousands) by 95 and take 11, 9 or 7 per cent of this amount as the number of pounds we will use for 8, 10 or 12 point type, respectively.

M. F. Stock

Plate 32 weighs .080 gram for the ink on ten sheets, a covering capacity of 1,417,000 square inches, and compared to the weight of a solid of the same area (.839 gram) it is 9½ per cent solid.

Plate 33 weighs .074 gram for a like area, a covering capacity of 1,532,000 square inches, and compared as before it is practically 9 per cent solid.

Plate 34 weighs .062 gram for ten sheets, a covering capacity of 1,829,000 square inches, and is 7½ per cent solid.

On M. F. stock we now have this formula. Figure 135,000 square inches for the covering capacity of 25-cent Book Black and then 9½ per cent of that amount for 8-point type, 9 per cent for 10-point and 7½ per cent for 12-point.

S. & S. C. Stock

Plates 35, 36 and 37 tested practically the same, .050 gram for ten sheets, which is a covering capacity of 2,268,000 square inches for a pound of 25-cent Book Black. The area is therefore 9.7 per cent solid. Figure 220,000 square inches per pound on S. & S. C. stock of this finish for this quality black ink on solids and take 9.7 per cent of this amount for

these type-faces. The fact that the three different type-faces take the same amount of ink on this stock is accounted for largely by the hardness of the surface and the great difference on antique stock by the softness of the stock. The smaller the type on antique stock the greater the tendency to punch through, which adds the shoulder of the type-face to the area of the printing surface. On S. & S. C. it is also difficult to gauge the correct quantity of ink, as it is more likely to offset on this stock than on M. F. If our problem was the determination of the relative areas of the three type-faces solely, the results on M. F. stock would be more nearly correct than the other figures.

PERCENTAGE OF INK REQUIRED BY MIXED DISPLAY TYPE AND ILLUSTRATION AS COMPARED TO SOLIDS

Let us take Plate 3 as an example. It is 4 x 6½ inches instead of 6¼ inches, making a difference of 1 square inch in area, so that in using the formula $X = \frac{113400}{Y}$, we must take 96 per cent of the weight in grams as " Y." One series of tests was as follows:

Stock Used.	Weight of Del Black in Grams.	96 Per Cent of This Amount.	Thousands of Square Inches Per Pound.	Percentage Compared to Solid.
S. & S. C., as on Plates 35-37.	.045	.0432	2,625	8.4
M. F., as on Plates 32-34....	.075	.072	1,575	8.6
Antique, as on Plates 28-31.	.110	.1056	1,074	8.9
Cameo Sepia, as on Plate 5..	.075	.072	1,575	12.8

Compare these percentages with those of straight type-matter above. It would be very interesting to lay out various jobs so that the percentage of solid matter ran from 7 to 70 and use these as standards in teaching the estimation of covering capacity. Perhaps I may be able to work this out at a later date, and it is my regret that the publication date of this book prevents my adding more weighings of this character. This is the most difficult part of the estimator's

job, and no example would give exactly the same surface as that which had to be estimated. Let us now consider the

PERCENTAGE OF INK REQUIRED BY A HALF-TONE AS COMPARED TO SOLID

The weight of the half-tone black on ten sheets like Plate 38 is .235 gram, which gives a covering capacity of 483,000 square inches to the pound. The weight of a solid of the same size printed on the same stock is .350 gram, which gives the percentage the half-tone bears to solid as 67. Both of these weighings represent sheets carrying a "full color," and granting that the half-tone used may be 5 per cent heavier than normal in order to give it a "snappy" effect, we have 62 per cent as our factor for high-grade half-tone work. To get this blackness the ink must fit the paper perfectly without any tendency to offset. Let us compare this Lustre Black with the Process Black shown on Plate 51 with regard to the covering capacity on Plate 38, using the same stock. The solid of ten sheets of Process Black weighs .591 gram, and the half-tone .180, or 30 per cent as much ink for half-tone as solid, but the result, although not gray, owing to the fact that the Process Black is heavily toned with Reflection Blue, lacks character and "snap." It is not a decided black, and "jet blackness" is not obtained from a half-tone black of the highest covering capacity, as a deposit of carbon rather than a thin film of a dye is required to obtain this result. From other tests I found that 52 per cent was the lowest ratio that could be safely figured and obtain satisfactory "blackness." This applies particularly to high-grade book inks and second-grade half-tone inks which are not toned with as much blue and therefore appear "gray" more readily. Figure, therefore, half-tones 62 per cent solid for black results and 52 per cent for average work. This brings us to a further consideration of

THE RELATION OF COVERING CAPACITY TO FITTING THE STOCK WITH THE INK

Plates 39 to 46 illustrate the effect produced by printing the same ink on eight well-known papers. It is hard to

believe that Plates 45 and 46 are printed with the same ink, and the question might arise as to whether the quantity of ink was the same on both sheets. Obviously not, as the two stocks require different amounts to cover thoroughly, and if the Cameo in Plate 46 looks to be flooded, the effect is due to the development of the stain in the duplex ink after printing and not to too much ink carried at the time. It was this excessive "toning-out" quality of Cameo paper with Duplex or two-shade inks that caused Philip Ruxton, Incorporated, to place the Dullopaque colors on the market. These dry out with only a reasonable amount of "spreading" and with a soft, dull finish. Compare Plates 5, 6 and 27. Two-shade inks containing as much stain as Duplex Sepia No. 621 must be slip-sheeted, while some of the Dullopaques such as C-95 may be run on Cameo paper without slip-sheeting if the form is not too heavy. The Superb stock on Plate 45 does not tone out to any great extent, which makes it safer for the uninitiated printer to handle, as slip-sheeting is not imperative and the correct quantity of ink is not difficult to gauge. If we tabulate the results of the covering capacity of these various stocks in Plates 39 to 46, we may make a comparison of the effect and the quantity of ink carried on.

Duplex Sepia No. 621 (Half-tone) on	Weight in Grams for 250 Sq. In.	Thousands of Sq. In. per Lb.
S. & S. C. Book (Plate 39)	.211	537
Empire Enamel (Plate 40)	.080	1,418
Diamond D (Plate 41)	.147	771
Lustro Enamel (Plate 42)	.169	671
Snowflake (Plate 43)	.193	588
B. & S. Duotone (Plate 44)	.170	667
Superb Dull Finish (Plate 45)	.208	545
Cameo Ivory (Plate 46)	.376	304

The S. & S. C. stock of Plate 39 is seldom used for Duplex inks, but considering the grade of the paper the effect and covering capacity is satisfactory; Plate 40 shows clean printing, but little character to the color and no two-shade effect; Plate 41 carries some two-shade effect and shows

good life in the foreground, clean whites in the building and good brilliancy in the sky; Plate 42 shows the two-shade effect of the ink in a considerable degree and takes the ink nicely, but the color of the stain does not suit this stock quite so well as the action of the ink in Plate 43; in Plate 44 the ink tones out somewhat stronger in the foreground, especially in the solids, but the sky is not quite so clean as in some of the other plates; Plate 45 shows a clean-printing piece of dull stock, but to pay a higher price for a Duplex ink for this stock would be extravagance. It absorbs all the stain and neutralizes it in a most astonishing manner; finally Plate 46 shows a wonderful toning-out quality, so much so that a printer could add half Dullo Black to Duplex Sepia and still have plenty of two-shade effect on this stock. As explained above, effects may be obtained on this stock with Dullopaque inks, which are most desirable, especially for art subjects. In weighing these tests, the excessively high covering capacity of Empire Enamel surprised me. Of course it was not suited for bringing out the effects of this ink, as the sample will show, but supposing its covering capacity was higher on black? I was doomed to disappointment, however, as printing Plate 38 on it with Lustre Black gave .230 gram for ten sheets, a covering capacity of 490,000 square inches, practically the same as for the stock used on that plate. In order to compare the covering capacities obtained with the two-shade ink still further, I ran the same stocks again, using Process Black for the reason that its nature and consistency resembles the Duplex Sepia more than Lustre Black. Here are the results:

Process Black on (Plate 38)	Weight in Grams for 250 Sq. In.	Thousands of Sq. In. per Lb.
S. & S. C. Book (Plate 39)	.300	378
Empire Enamel (Plate 40)	.175	648
Diamond D (Plate 41)	.180	630
Lustro Enamel (Plate 42)	.170	667
Snowflake (Plate 43)	.165	687
B. & S. Duotone (Plate 44)	.221	513
Superb Dull Finish (Plate 45)	.370	307
Cameo Ivory (Plate 46)	.385	295

On S. & S. C. stock the color is fair only; on Empire it is "washed out" in appearance; on Diamond D gray, but better than on Empire, although not within 25 per cent as good as results obtained with a No. 1 Book Black which fitted the stock; on Lustro the result is fair, but a long way from perfect; Snowflake looks about as black as the sample on Diamond D and the B. & S. Duotone resembles Lustro. On Superb the effect is very good and on Cameo it is a little too black. An accurate comparison of the enamels would be out of place here, as the prices of the stocks are not the same nor the weights, but Superb, which gives the only perfect results with this ink, requires about the same weight of ink, it will be noticed, as the Cameo Ivory required of Duplex Sepia. Since the war the coatings of enamels have changed so much in their relation to absorption of ink that Process Black, which formerly fitted most of the enamels mentioned, has been supplanted by the Lustre Black shown on Plate 38 for straight half-tone work. The Process Black still has its place for light screens where the minimum quantity of color is desirable and on more absorbent papers such as Superb. Dullo Black, however, fits both Superb and Cameo.

COVERING CAPACITY OF INK ON FOUR-COLOR WORK

The analysis of Plate 47, as indicated by the progressive proofs which follow the order in which the colors were run, gives us these facts:

Color.	Weight of Ink on Size Shown.	Weight of Ink on 25 Sq. In. (25 per cent more).	Thousands of Sq. In. to the Lb.
Yellow	.225	.281	400
Red	.095	.119	950
Red over Yellow	.080	.100	1,130
Black	.040	.050	2,270
Black over Red and Yellow	.040	.050	2,270
Peacock Blue	.125	.156	727
Blue over the other colors	.125	.156	727

You will notice that it took 19 per cent more red when red was printed alone than over yellow, while with black and blue the results were the same whether the color was lapped or not.

For the sake of comparison, let us bring the above results into decimal parts of a pound, with the yellow as 1.000.

Yellow.	Red.	Black.	Blue.
1.000	.356	.178	.555

Is this an average ratio for four-color work? It depends, first of all, on the strength of the yellow used as a basis of comparison and then on the nature of the subjects reproduced. The covering capacity of the yellow, while not as great as Ruxton's concentrated yellow, is high compared to some yellows used by colortype houses. Compare Plate 38 with Plate 48; we know that the weight of Lustre Black on the former is .235 gram and the yellow on the latter is .225 gram (.281 for 25 square inches), which, after making an allowance for the difference in the plates, is lighter than we expect. Blacks cover, as a rule, at least 50 per cent more than the average yellow.

It is hard to define an average subject; the blue in Plate 47 is too heavy to make that plate an example, but by comparing the progressive proofs of the job you are estimating with the proofs shown here you will be able to arrive at approximate quantities.

Perhaps the most unusual proportions for four-color work are found in the fruit catalogue. There nearly every page is made up largely of light green and yellow. On a sheet 32 by 44 of this kind of work the yellow ran 4.600 pounds per thousand; red, 1.000; blue, .800, and black, .500. Comparing this to yellow as before, we have:

Yellow.	Red.	Black.	Blue.
1.000	.217	.109	.174

It must be remembered that we are not comparing the same colors nor are the amounts careful weighings, but represent pressroom reports, which include wastage. One firm printing mail-order inserts exclusively, on a McKee

four-color press, figures 2.86 pounds of ink per thousand, thirty-two-page forms, 8½ by 11. The ink is distributed as follows:

Yellow.	Red.	Black.	Blue.
1.000	.474	.684	.852

Ninety-five per cent of the amount of each color will give the result in actual pounds.

One colortype house figures this proportion for carpets on flat-bed presses:

Yellow.	Red.	Blue.
1.000	.333 to .400	.333

Two others figure:

Yellow.	Red.	Blue.
1.000	.250	.375

The amount of yellow could be decreased considerably by using a mixture containing part concentrated yellow. The yellow used in printing Plate 47, although principally a pigment yellow, contained some of this material, which accounts for the higher covering capacity.

THE PERCENTAGE TO ADD FOR WASTAGE

After making an estimate as to the amount of ink required, it is necessary to add something for loss of ink, as the figures given here are net. The press used in proving was a Colt's Armory Laureate and the figures given would probably be 5 per cent less for cylinder work on long runs. The loss may occur by not cleaning the can thoroughly, by the ink becoming " dirty " in the fountain and by the amount left over at the end of the run. It is safe to say that the wastage is always 5 per cent even when the same form is kept on for a week. A large job on bible paper was analyzed carefully in this respect. Thirty-two pages, 7$\frac{3}{16}$ by 5¼, or 1,206 square inches, printed in 7-point type, required 95 hundredths of a pound per thousand impressions, which with a carefully compiled record showed exactly 5 per cent wastage. The covering capacity of the ink was therefore 1,330,000

square inches. On rotary work on print stock nearly 4 per cent of the ink must be reground, owing to paper dust getting into the fountain and on the plates.

The following may be a good method of figuring, as it takes into consideration the wastage getting started as well as the amount left over:

Jobs requiring 1 pound of ink figure 25 per cent on job press; 100 per cent on cylinder.

Jobs requiring 2 pounds of ink figure 20 per cent on job press; 50 per cent on cylinder.

Jobs requiring 5 pounds of ink figure 15 per cent on job press; 20 per cent on cylinder.

Jobs requiring 10 pounds of ink figure 10 per cent on job press; 15 per cent on cylinder.

Jobs requiring 25 pounds of ink figure 8 per cent on job press; 10 per cent on cylinder.

Jobs requiring 50 pounds of ink figure 6 per cent on job press; 8 per cent on cylinder.

Jobs requiring 100 pounds of ink figure 5 per cent on job press; 7 per cent on cylinder.

THE PERCENTAGE TO ADD FOR A FULL COLOR

The figures given in the following tables, unless otherwise specifically mentioned, are for minimum or fair covering of the stock. With some colors, such as yellows, ultramarine blue, earth colors, etc., there is no advantage in carrying excess color; but with lake or pulp reds, bronze-blues, etc., the beauty or the sheen of the color does not appear when only the minimum amount is carried on. The amount to be added would vary for different stocks, but from tests made of bronze-blue on enamel paper a deduction of 15 per cent from the covering capacity would be an average allowance. Each printer should try to correct the figures given here so that they apply directly to his own work and the stock on the floor, which is a variable item, especially at this time. The blank pages which follow the tables are for these records.

TABLE OF COVERING CAPACITIES ON SOLIDS

Antique Stock
(Plates 28 to 31)

	Grams	Thousands of Square Inches Per Pound
Book Black	1.187	95
Process Half-tone Black	1.225	93
Label Blue (Bronze)	1.172	97
Second Grade Label Blue (Bronze)	1.270	89
Label Yellow	1.911	59
High-grade Ultramarine	1.668	68
High-grade Pulp Red	1.712	66
Process Red	1.356	84
English Vermilion	2.660	43
Cover Yellow	1.360	83
Cover White	4.770	24

Machine Finish
(Plates 32 to 34)

Book Black	.839	135
Process Half-tone Black	.790	144
Label Blue (Bronze)	.833	136
Label Yellow	1.375	82
High-grade Ultramarine	.950	119
High-grade Pulp Red	1.107	102
Process Red	.860	132

S. & S. C.
(Plates 35 to 37)

Book Black	.515	220
Process Half-tone Black	.515	220
Label Blue (Bronze)	.462	245
Label Yellow	.740	153
High-grade Ultramarine	.494	229
High-grade Pulp Red	.580	196
Process Red	.520	218

Cover-stock
(Suede Book, Plates 11 to 14)

	Grams.	Thousands of Sq. In. per Lb.
English Vermilion	3.390	33
Cover Yellow	1.840	62
Cover White	4.500	25

Chromac Offset Book
(Frontispiece)

	Grams	Thousands of Square Inches Per Pound
Book Black	.947	120
Process Half-tone Black	1.115	102
Dullo Black A-159	.880	129
Label Blue (Bronze)	1.040	109
Label Yellow	1.235	92
High-grade Ultramarine	1.005	113
High-grade Pulp Red	1.277	89*
Process Red	.855	132
English Vermilion	1.765	64

Snowflake Enamel
(Plate 43)

Process Half-tone Black A-34	.407	279
Dullo Black	.490	231†
Label Blue (Bronze)	.450	252
Label Yellow	.810	140
High-grade Ultramarine	.448	253
High-grade Pulp Red	.486	233
Process Red	.447	254
English Vermilion (lays poorly)	.965	118‡

Cameo Sepia
(Plates 5 and 27)

Del Black (for comparison)	.570	199
Process Half-tone Black	.600	189
Dullo Black	.575	197

*This red on Chromac has a deep rich color, and while the stock absorbs a large quantity of ink the finish remains good; with Process Red the result is also beautiful, but the color shows the undertone of the ink and not the overtone, as with the Pulp Red. The differences in covering capacities are, therefore, not comparable as the results obtained show that each ink has its proper use and in order to gain a given depth of color that character of ink with the larger amount of color must be carried on.

†Dullo Black is made for dull or rough papers, although it is used for half-tones and type on enamels.

‡The laying quality of Vermilion makes its use impossible on enamels; its place has been taken by Flaming Scarlet, which takes a good finish and has a high covering capacity.

Bleached Manila Carton Stock

Ink.	Weight of Ink (4 sheets), 100 Sq. In.	Weight of 250 Sq. In.	Thousands of Sq. In. per Lb.
High-grade News Black	.255	.638	178
Full Color	.310	.775	146
Del Black	.305	.762	149
Full Color	.390	.975	116
Second Grade Label Blue (Bronze)	.375	.938	121
High-grade Ultramarine (for comparison with other stocks)	.263	.658	172
High-grade Carton Yellow	.705	1.763	64
High-grade Carton Red	.500	1.250	91
American Carton Red (no finish)	.460	1.150	99

(Note.— Deduct 20 per cent from covering capacity for " full " color on this stock. News ink is not of suitable blackness nor drying quality for either Bleached Manila or Patent White Stock. It is added for comparison.)

Patent White Carton Stock

Ink.	Weight of Ink (4 sheets), 100 Sq. In.	Weight of 250 Sq. In.	Thousands of Sq. In. per Lb.
High-grade News Black	.185	.463	245
Del Black	.148	.370	307
Full Color	.170	.425	267
Second Grade Label Blue (Bronze)	.270	.675	168
High-grade Ultramarine	.205	.513	221
High-grade Carton Yellow	.495	1.238	92
High-grade Carton Red	.340	.850	133
American Carton Red (no finish)	.320	.800	142

(Note.— Deduct 15 per cent from covering capacity for " full " color on this stock.)

NON-FADING 50-POUND POSTER STOCK

Ink.	Weight of 250 Sq. In.	Thousands of Sq. In. per Lb.
High-grade News Black	.790	144
Full Color	.930	122
Del Black	.715	159
Full Color	.820	138
Poster Yellow	1.745	65
Poster Red (1916 manufacture)	1.638	69
Poster Blue (1916 manufacture)	1.165	97

(NOTE.— Deduct 15 per cent from covering capacity for " full " color on this stock.)

TINTS

I have not included tints in the preceding tables for the reason that the manner in which tints are made determines their covering capacity. On Diamond D enamel a buff tint made with one white covered 171,000 square inches; with another white, 187,000; with transparent white, 222,000, and with Ruxton's Tint Base, 324,000. On most of the enamels 250,000 square inches may be easily obtained if the inkmaker understands this subject. Likewise in running yellows on a stock as gray as Bleached Manila Carton stock, a covering capacity of 100,000 square inches may be obtained by mixing the yellow with special carrying agents. This will impair the brilliancy of the color to some extent.

LAPPED COLORS

The covering capacity of the second color is determined by the surface presented by the first color and varies for different stocks. On antique stock (Plates 28 to 31) High Grade Pulp Red covered 66,000 square inches, but over Label Yellow it covered 100,000 on this stock. On some enamels the covering capacity of the red over yellow is no greater than the red on the stock itself, while others show an increase in covering capacity of twenty per cent. The harder the stock the less difference in covering capacity between lapped colors and colors run straight, and conversely, the softer the stock the greater the increase in the covering capacity of the second color.

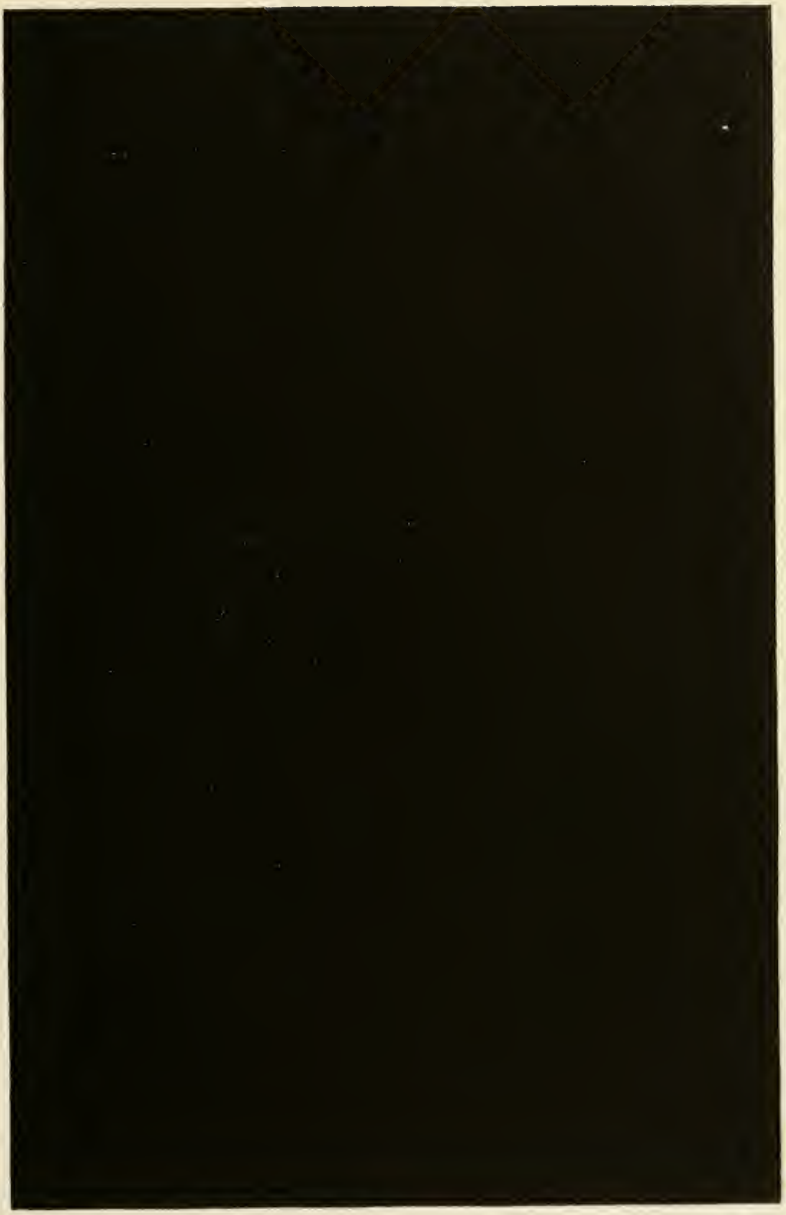


PLATE 28.

In the beginning, man went forth each day—some to do battle, some to the chase; others, again, to dig and to delve in the field—all that they might gain and live, or lose and die. Until there was found among them one, differing from the rest, whose pursuits attracted him not, and so he stayed by the tents, and traced strange devices with a burnt stick upon a gourd.

This man, who took no joy in the ways of his brethren—who cared not for conquest, and fretted in the field—this designer of quaint patterns—this deviser of the beautiful—who perceived in Nature about him curious curvings, as faces are seen in the fire—this dreamer apart, was the first artist.

And presently there came to this man another—and, in time, others—of like nature, chosen by the Gods—and so they worked together; and soon they fashioned, from the moistened earth, forms resembling the gourd. And with the power of creation, the heirloom of the artist, presently they went beyond the slovenly suggestion of Nature, and the first vase was born, in beautiful proportion.

And the toilers tilled, and were athirst; and the heroes returned from fresh victories, to rejoice and to feast; and all drank alike from the artists' goblets, fashioned cunningly, taking no note the while of the craftsman's pride, and understanding not his glory in his work; drinking at the cup, not from choice, not from a consciousness that it was beautiful, but because, forsooth, there was none other!

And history wrote on, and conquest accompanied civilization, and Art spread, or rather its products were carried by the victors among the vanquished from one country to another. And the customs of cultivation covered the face of the earth, so that all peoples continued to use what *the artist alone produced.*

And centuries passed in this using, and the world was flooded with all that was beautiful, until there arose a new class, who discovered the cheap, and foresaw fortune in the facture of the sham. Then sprang into existence the tawdry, the common, the gewgaw.

The taste of the tradesman supplanted the science of the artist, and what was born of the million went back to them, and charmed them, for it was after their own heart; and the great and the small, the statesman and the slave, took to themselves the abomination that was tendered, and preferred it—and have lived with it ever since!

And the artist's occupation was gone, and the manufacturer and the huckster took his place.

Nature contains the elements, in colour and form, of all pictures, as the key-board contains the notes of all music. But the artist is born to pick, and choose, and group with science, these elements, that the result may be beautiful—as the musician gathers his notes, and forms his chords, until he bring forth from chaos glorious harmony.

He does not confine himself to purposeless copying, without thought, each blade of grass, as commended by the inconsequent, but, in the long curve of the narrow leaf, corrected by the straight tall stem, he learns how grace is wedded to dignity, how strength enhances sweetness, that elegance shall be the result.

In the citron wing of the pale butterfly, with its dainty spots of orange, he sees before him the stately halls of fair gold, with their slender saffron pillars, and is

Johann Froben, who achieved a well-deserved reputation as one of the most enlightened and enterprising publishers of the sixteenth century, and who will be remembered as having been honoured with the friendship and confidence of Erasmus, was born in 1460, in Hammelburg, a village in Franconia. He studied in the University of Basel (which had been founded the year before his birth), and achieved distinction as a scholar in Latin, Greek and Hebrew. He was trained as type-setter and press-corrector by the famous printer Amerbach, and thus equipped, he secured citizenship in Basel in 1490, and in the following year began business in his own name as a master printer and publisher. Gutenberg had been dead for twenty years, but the business established by Fust and Schöffer with the original Gutenberg plant (representing the earliest printing concern in Europe) was still being carried on by the son of Schöffer. The work of Caxton, which had been begun in Burges in 1470, had, in 1474, been transferred to London, and closed with his death in 1492, the year in which Aldus Manutius began his printing operations in Venice. In paris the leading typographer of the town was Badius, the predecessor of the more famous Estiennes.

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Froben's first publication was a Latin Bible in convenient

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In the beginning, man went forth each day—some to do battle, some to the chase; others, again, to dig and to delve in the field—all that they might gain and live, or lose and die. Until there was found among them one, differing from the rest, whose pursuits attracted him not, and so he stayed by the tents, and traced strange devices with a burnt stick upon a gourd.

This man, who took no joy in the ways of his brethren—who cared not for conquest, and fretted in the field—this designer of quaint patterns—this deviser of the beautiful—who perceived in Nature about him curious curvings, as faces are seen in the fire—this dreamer apart, was the first artist.

And presently there came to this man another—and, in time, others—of like nature, chosen by the Gods—and so they worked together; and soon they fashioned, from the moistened earth, forms resembling the gourd. And with the power of creation, the heirloom of the artist, presently they went beyond the slovenly suggestion of Nature, and the first vase was born, in beautiful proportion.

And the toilers tilled, and were athirst; and the heroes returned from fresh victories, to rejoice and to feast; and all drank alike from the artists' goblets, fashioned cunningly, taking no note the while of the craftsman's pride, and understanding not his glory in his work; drinking at the cup, not from choice, not from a consciousness that it was beautiful, but because, forsooth, there was none other!

And history wrote on, and conquest accompanied civilization, and Art spread, or rather its products were carried by the victors among the vanquished from one country to another. And the customs of cultivation covered the face of the earth, so that all peoples continued to use what *the artist alone produced.*

And centuries passed in this using, and the world was flooded with all that was beautiful, until there arose a new class, who discovered the cheap, and foresaw fortune in the facture of the sham. Then sprang into existence the tawdry, the common, the gewgaw.

The taste of the tradesman supplanted the science of the artist, and what was born of the million went back to them, and charmed them, for it was after their own heart; and the great and the small, the statesman and the slave, took to themselves the abomination that was tendered, and preferred it—and have lived with it ever since!

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Nature contains the elements, in colour and form, of all pictures, as the key-board contains the notes of all music. But the artist is born to pick, and choose, and group with science, these elements, that the result may be beautiful—as the musician gathers his notes, and forms his chords, until he bring forth from chaos glorious harmony.

He does not confine himself to purposeless copying, without thought, each blade of grass, as commended by the inconsequent, but, in the long curve of the narrow leaf, corrected by the straight tall stem, he learns how grace is wedded to dignity, how strength enhances sweetness, that elegance shall be the result.

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PLATE 43.

PLATE 44.

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